

TITLE OF THE INVENTION

A SYSTEM FOR TRANSMISSION/RECEPTION OF E-MAIL WITH ATTACHED FILES

5 BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates to an e-mail transmission/reception system. More specifically, the present invention relates to a system for transmission/reception of e-mail with attached files.

(2) Description of the Related Art

The Internet is basically available through terminals provided at offices and homes. Recently, however, new usage patterns of Internet such as "mobile computing" and "mobile Internet" are becoming common. In the mobile computing, the Internet is accessed by cellular phones and Personal Handyphone Systems (PHS) connected to personal computers or Personal Digital Assistants (PDA). The mobile Internet (e.g., Internet service for cellular phones) refers to a usage pattern that combines mobile machines, which are free from restrictions on time and space, and Internet, which contains information all over the world. As the mobile computing and the mobile Internet become widespread, we become able to easily send and receive e-mail at anytime and anyplace. However, when sending e-mail with attached files to the cellular phones and PHSs, the attached files are automatically deleted in most of the mobile Internet services.

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Meanwhile, there are some mobile Internet services for storing attached files in the server and forwarding them to another receiver's address. For instance, a service named "MOZIO e-mail" provided by ASTEL group including TOKYO
5 TELECOMMUNICATION NETWORK CO., INC, stores an attached file included in the received e-mail in a mail server, adds a message "The mail includes an attached file" to the e-mail from which the attached file has been removed to inform a subscriber of the existence of the attached file. Then, if the subscriber
10 forwards the e-mail with such a message from PHS to another address that is available from a personal computer or the like, the mail server attaches the stored file to the e-mail and sends the e-mail to the other address. Thus, the subscriber can receive the e-mail with the attached file by means of the
15 personal computer.

In addition, similar technology is disclosed in the Japanese Laid-Open Patent Application No. 11-175419. This application discloses an e-mail transmission/reception system in which, when forwarding e-mail with an attached file from a
20 mail terminal to another receiver's address, there is no necessity to transmit the attached file from the mail terminal to a mail server.

This e-mail transmission/reception system is composed of a mail terminal equipped with Mail User Agent (MUA), a mail
25 gateway that relays e-mail between the mail terminal and a mail server, and the mail server equipped with Mail Transport Agent (MTA).

Here, the MUA is a program for providing a user interface

to read and write e-mail, and the MTA is a program for delivering e-mail.

When receiving an acquisition request for the e-mail, which is received by the mail server, from the mail terminal, the mail gateway acquires the e-mail from the mail server, separates an attached file from the e-mail, stores the separated file having a mail ID, and manages the file. When receiving e-mail (consisting of the main body and a mail ID for identifying the original mail) that should be forwarded to another address from the mail terminal, the mail gateway attaches the stored and managed attached file to the e-mail on the basis of the mail ID for identifying the original mail and sends the e-mail consisting of the main body and the attached file to the mail server.

In this way, the above-mentioned system enables the mail terminal to send e-mail with an attached file to a forwarding address only by sending e-mail having a mail ID for identifying the original mail to the mail gateway.

However, according to the above-mentioned conventional system, when a plurality of attached files are included in the mail, there is a problem that an file to be attached cannot be selected from the plurality of attached files but all files included in the e-mail are unconditionally attached to the e-mail, because mail IDs are used for linking e-mail and attached files. That is, in the conventional system, it is impossible to send e-mail including an attached file that a user selects among a plurality of attached files without attaching the attached file by the mail terminal. The same goes for the

above-mentioned service "MOZIO e-mail."

SUMMARY OF THE INVENTION

To cope with the above-mentioned problem, the object of
5 the present invention is to provide an e-mail
transmission/reception system, a mail gateway, a mail terminal,
a program recording medium, and a program by which, when using
attached files included in the received e-mail (e.g.,
forwarding of e-mail), a user can select attached files that
10 the user wants to attach to the e-mail among a plurality of
attached files included in the received plural pieces of e-
mail, and the e-mail including the selected attached files can
be transmitted to the receivers' addresses of the e-mail,
without attaching the selected attached files to the e-mail by
15 the mail terminal.

An e-mail transmission/reception system according to the
invention includes a mail terminal, a mail server, and a mail
gateway, wherein the mail gateway is connected to the mail
terminal via a network and the mail server via another network.
20 The mail server is made up of: an attached file holding unit
operable to receive e-mail addressed to a user who possesses
the mail terminal and hold one or more attached files included
in the e-mail; and a mail distribution unit operable to receive
e-mail transmitted from the mail gateway and distribute the
25 e-mail to one or more receivers' addresses thereof. The mail
gateway is made up of: an identifier generation unit operable
to generate an identifier for each attached file held by the
attached file holding unit; a list transmission unit operable

to generate a list of identifiers generated by the identifier generation unit and transmit the list to the mail terminal; a reception unit operable to receive e-mail transmitted from the mail terminal, the e-mail including one or more identifiers that the user selects from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; an attached file acquisition unit operable to acquire attached files from the attached file holding unit, the attached files corresponding to the identifiers included in the e-mail received by the reception unit; a construction unit operable to construct e-mail by attaching the attached files acquired by the attached file acquisition unit to the e-mail received by the reception unit; and a mail transmission unit operable to transmit the e-mail constructed by the construction unit to the mail server. The mail terminal is made up of: a list reception unit operable to receive the identifier list from the mail gateway; a preparation unit operable to prepare e-mail that includes one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; and a transmission unit operable to transmit the prepared e-mail to the mail gateway (hereafter called system A).

With this construction, the e-mail transmission/reception system of the invention associates an attached ID with each of the attached files included in the received e-mail when using the attached files. Thereby, when attached files to be forwarded is prepared in the mail terminal, the attached file that the user wants to attach to the e-mail

can be selected by the attached ID, without attaching the attached files to the e-mail, so that the e-mail including the selected attached file can be transmitted to the receivers' addresses. In addition, new e-mail including attached files
5 can be prepared using the attached files included in the e-mail that has been received and stored in the system. Further, the data size of the e-mail with attached IDs that are associated with attached files is smaller than that of the e-mail with attached files, so that a load applied to the line between the
10 mail terminal and the mail gateway can be reduced, and therefore even in the case of cellular phones whose transmission speed is low, attached files can be practicably (i.e., in a short time period and at a low cost) transmitted to the receivers' addresses.

15 Also, the mail terminal can prepare e-mail including attached IDs that have one to one correspondence to each of the attached files included in the received e-mail and can transmit the prepared e-mail to the receivers' addresses.

In addition, in the above e-mail transmission/reception
20 system A, the attached file holding unit, whenever receiving e-mail that includes attached files, generates a list of the attached files and passes the list to the identifier generation unit, and the identifier generation unit generates an identifier for each of the attached files in accordance with
25 the list passed by the attached file holding unit.

With this construction, in addition to the above-stated effects, the mail server of the e-mail transmission/reception system of the invention, when receiving e-mail, notifies the

mail gateway of the list of attached IDs that are associated with the attached files addressed to the user of the mail terminal, so that there is no necessity for the user to perform a procedure for acquiring the list of attached IDs.

5 In addition, in the above e-mail transmission/reception system A, the mail terminal is further made up of: a file format registration unit operable to register one or more file formats of attached files for each receiver's address that the receiver should adopt in the mail gateway, the mail gateway is further
10 made up of: a file format storage unit operable to store receivers' addresses and file formats that are registered by the file format registration unit; and a file format conversion unit operable to convert file formats of attached files for each receiver's address in accordance with the receivers' addresses
15 and the file formats that are stored in the file format storage unit, wherein the construction unit constructs e-mail by attaching the attached files converted by the file format conversion unit from and as a substitute for the attached files acquired by the attached file acquisition unit.

20 With this construction, in addition to the above-stated effects, the e-mail transmission/reception system of the invention can convert attached files for each receiver's address to construct e-mail, and can transmit e-mail suitable for the receiver's address.

25 In addition, in the above e-mail transmission/reception system A, the mail terminal is further made up of: a sharing notification unit operable to notify the mail gateway that one or more attached files included in e-mail addressed to the user

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of the mail terminal are to be shared with other users, the mail gateway is further made up of: an attached file sharing unit operable to, when receiving the notification that the attached files are to be shared with the other users from the mail terminal, share each of the attached files held by the attached file holding unit with the other users; a shared identifier generation unit operable to generate a shared identifier for each of the attached files shared by the attached file sharing unit, wherein the shared identifier is available for sharers of the attached files, wherein the sharing notification unit further includes: a shared file notification unit operable to notify the mail gateway of one or more identifiers selected by the user from the identifier list as substitutes for the one or more attached files that are permitted to be shared; and a sharer notification unit operable to notify the mail gateway of one or more sharers of each of the attached files that are to be shared with the other users; wherein the attached file sharing unit shares attached files that correspond to the identifiers notified from the shared file notification unit among attached files held by the attached file holding unit with the sharers notified from the sharer notification unit, the list transmission unit further transmits a list of the shared identifiers to the sharers of the attached files, the attached file acquisition unit further acquires attached files that correspond to the shared identifiers, and the list reception unit further receives a list of shared identifiers that have one to one correspondence to each of the attached files that are shared by the user of the mail terminal as one member of

the sharers.

With this construction, in addition to the above-stated effects, attached files included in the e-mail addressed to the other users can be used among sharers of the attached files.

- 5 Therefore, attached files provided from the other users also can be attached to the e-mail to be transmitted.

10 A mail gateway according to the invention is connected to a mail terminal via a network and a mail server via another network, the mail server receiving e-mail addressed to a user of the mail terminal and hold one or more attached files included in the received e-mail, the mail gateway device is made up of:
15 an identifier generation unit operable to generate an identifier for each attached file held by the attached file holding unit; a list transmission unit operable to generate a list of identifiers generated by the identifier generation unit and transmit the list to the mail terminal; a reception unit operable to receive e-mail transmitted from the mail terminal, the e-mail including one or more identifiers selected by the user from the identifier list as substitutes for one or more
20 attached files that the user wants to attach to the e-mail; an attached file acquisition unit operable to acquire attached files from the mail server, the attached files corresponding to the identifiers included in the e-mail received by the reception unit; a construction unit operable to construct
25 e-mail by attaching the attached files acquired by the attached file acquisition unit to the e-mail received by the reception unit; and a mail transmission unit operable to transmit the e-mail constructed by the construction unit to the mail server.

With this construction, the mail gateway of the invention associates an attached ID with each of the attached files included in the received e-mail. Thereby, when using the attached files, the attached file that the user wants to attach to the e-mail can be selected by the attached ID without attaching the attached files to the e-mail, so that the e-mail including the attached file corresponding to the attached ID can be constructed and transmitted to the receivers' addresses.

A mail terminal according to the invention is connected to a mail gateway via a network, the mail gateway generating an identifier for each of attached files included in e-mail addressed to a user of the mail terminal and managing the generated identifier, the mail terminal is made up of: a list reception unit operable to receive a list of identifiers from the mail gateway; a preparation unit operable to prepare e-mail that includes one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; and a transmission unit operable to transmit the e-mail prepared by the preparation unit to the mail gateway.

With this construction, when using attached files included in the received e-mail, the mail terminal of the invention prepares e-mail including attached IDs. Thereby, the e-mail to which the attached files corresponding to the attached IDs are attached can be transmitted to the receivers' addresses of the e-mail.

According to the invention, a method for controlling an e-mail transmission/reception system including a mail terminal,

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a mail server, and a mail gateway, the mail gateway being connected to the mail terminal via a network and the mail server via another network, the method is made up of the following steps of: an attached file holding step for receiving e-mail addressed
5 to a user who possesses the mail terminal and holding one or more attached files included in the e-mail in the mail server; an identifier generation step for, by the mail gateway, generating an identifier for each attached file held in the attached file holding step; a list transmission step for
10 generating a list of identifiers generated in the identifier generation step and transmitting the list from the mail gateway to the mail terminal; a list reception step for receiving the identifier list from the mail gateway by the mail terminal; a preparation step for, by the mail terminal, preparing e-mail
15 that includes one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; a transmission step for transmitting the e-mail prepared in the preparation step to the mail gateway; a reception step for receiving e-
20 mail transmitted from the mail terminal by the mail gateway, the e-mail including one or more identifiers that the user selects from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; an attached file acquisition step for acquiring attached files
25 from the mail server by the mail gateway, the attached files corresponding to the identifiers included in the e-mail received in the reception step; a construction step for, by the mail gateway, constructing e-mail by attaching the attached

files acquired in the attached file acquisition step to the e-mail received in the reception step; and a mail transmission step for transmitting the e-mail constructed in the construction step from the mail gateway to the mail server; and
5 a mail distribution step for receiving the e-mail transmitted from the mail gateway terminal by the mail server and distributing the e-mail from the mail server to receivers' addresses of the e-mail.

With this construction, the method for controlling the
10 e-mail transmission/reception system of the invention associates an attached ID with each of the attached files included in the received e-mail when using the attached files. Thereby, when attached files to be forwarded is prepared in the mail terminal, the attached file that the user wants to attach
15 to the e-mail can be selected by the attached ID, without attaching the attached files to the e-mail, so that the e-mail including the selected attached file can be transmitted to the receivers' addresses. In addition, new e-mail including attached files can be prepared using the attached files included
20 in the e-mail that has been received and stored in the system. Further, the data size of the e-mail with attached IDs that are associated with attached files is smaller than that of the e-mail with attached files, so that a load applied to the line between the mail terminal and the mail gateway can be reduced,
25 and therefore even in the case of cellular phones whose transmission speed is low, attached files can be practicably (i.e., in a short time period and at a low cost) transmitted to the receivers' addresses.

Also, the mail terminal can prepare e-mail including attached IDs that have one to one correspondence to each of the attached files included in the received e-mail and can transmit the prepared e-mail to the receivers' addresses.

5 According to the invention, a recording medium which is readable for a computer connected to a mail terminal via a network and a mail server via another network, the mail server receiving e-mail addressed to a user of the mail terminal and holding one or more attached files included in the received
10 e-mail, a computer program embodied on the recording medium has the computer conduct the steps of: an identifier generation step for generating an identifier for each attached file held by the mail server; a list transmission step for generating a list of identifiers generated in the identifier generation step and
15 transmitting the list to the mail terminal; a reception step for receiving e-mail transmitted from the mail terminal, the e-mail including one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; an attached
20 file acquisition step for acquiring attached files from the mail server, the attached files corresponding to the identifiers included in the e-mail received in the reception step; a construction step for constructing e-mail by attaching the attached files acquired in the attached file acquisition step
25 to the e-mail received in the reception step; and a mail transmission step for transmitting the e-mail constructed in the construction step to the mail server.

With this construction, when the computer readable recording medium which records a program for mediating between the mail terminal and the mail server executes the program on general hardware such as computers, the hardware associates an attached ID with each of the attached files included in the received e-mail. Thereby, e-mail can be constructed so as to include attached files corresponding to the attached IDs without attaching attached files to be forwarded to the e-mail transmitted from the mail terminal and can be transmitted to receivers' addresses.

According to the invention, a recording medium which is readable for a computer that is connected to a mail gateway via a network, the mail gateway generating an identifier for each of attached files included in e-mail addressed to a user of a mail terminal and managing the generated identifier, a computer program embodied on the recording medium has the computer conduct the steps of: a list reception step for receiving a list of identifiers from the mail gateway; a preparation step for preparing e-mail that includes one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; and a transmission step for transmitting the e-mail prepared in the preparation step to the mail gateway.

With this construction, when the computer readable recording medium according to the invention that records a program equipped with a user interface for writing/reading e-mail executes the program on general hardware such as computers, the hardware prepares e-mail including attached IDs

as substitutes for attached files, so that e-mail with attached files corresponding to the attached IDs can be transmitted to the receivers' addresses.

According to the invention, a program embodied on a
5 computer connected to a mail terminal via a network and a mail server via another network, the mail server receiving e-mail addressed to a user of the mail terminal and holding one or more attached files included in the received e-mail, the program has the computer conduct the steps of: an identifier generation step
10 for generating an identifier for each attached file held by the mail server; a list transmission step for generating a list of identifiers generated in the identifier generation step and transmitting the list to the mail terminal; a reception step for receiving e-mail transmitted from the mail terminal, the
15 e-mail including one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; an attached file acquisition step for acquiring attached files from the mail server, the attached files corresponding to the identifiers
20 included in the e-mail received in the reception step; a construction step for constructing e-mail by attaching the attached files acquired in the attached file acquisition step to the e-mail received in the reception step; and a mail transmission step for transmitting the e-mail constructed in
25 the construction step to the mail server.

With this construction, when the program for mediating between the mail terminal and the mail server is executed on

general hardware such as computers, the hardware associates an attached ID with each of the attached files included in the received e-mail. Thereby, e-mail can be constructed so as to include attached files corresponding to the attached IDs

5 without attaching attached files to be forwarded to the e-mail transmitted from the mail terminal and can be transmitted to receivers' addresses.

According to the invention, a program embodied on a computer that is connected to a mail gateway via a network, the mail gateway generating an identifier for each of attached files included in e-mail addressed to a user of a mail terminal and managing the generated identifier, the program has the computer conduct the steps of: a list reception step for receiving a list of identifiers from the mail gateway; a preparation step for preparing e-mail that includes one or more identifiers selected by the user from the identifier list as substitutes for one or more attached files that the user wants to attach to the e-mail; and a transmission step for transmitting the e-mail prepared in the preparation step to the mail gateway.

20 With this construction, when the program equipped with a user interface for writing/reading the e-mail is executed on general hardware such as computers, the hardware prepares e-mail including attached IDs as substitutes for attached files, so that e-mail with attached files corresponding to the attached
25 IDs can be transmitted to the receivers' addresses.

BRIEF DESCRIPTION OF THE DRAWINGS

These and the other objects, advantages and features of the invention will become apparent from the following description thereof taken in conjunction with the accompanying drawings which illustrate a specific embodiment of the invention.

In the drawings:

Fig. 1 is a block diagram showing the construction of the e-mail transmission/reception system including a mail terminal, a mail gateway, and a mail server;

Fig. 2 shows a data structure of received e-mail with an attached file that the mail server receives;

Fig. 3 is a flowchart showing a procedure for forwarding the received mail by the mail terminal;

Fig. 4 shows a sequence for acquiring an attached ID corresponding to each of the attached files included in the received mail;

Fig. 5A shows a structure of a list of attached files, and Fig. 5B shows a structure of a list of IDs;

Fig. 6 is a correspondence table between attached files and attached IDs in case that the message ID of the received mail is set at "0123456789";

Fig. 7 is a flowchart showing a procedure for describing an attached ID that the ID acquisition unit acquires in the forwarded mail made from the received mail;

Fig. 8 shows a state where the mail preparation unit prepares the forwarded mail from the received mail;

Fig. 9 shows an example of a data structure of the forwarded mail prepared by the mail preparation unit;

Fig. 10 shows a sequence for sending the forwarded mail prepared from the received mail by the mail preparation to the forwarding address;

Fig. 11 is a flowchart showing a procedure for
5 constructing the forwarded mail sent from the mail terminal by the mail gateway;

Fig. 12 shows a data structure of the mail constructed from the forwarded mail by the mail gateway;

Fig. 13 is a block diagram showing the construction of
10 the e-mail transmission/reception system including a mail terminal, a mail gateway, and a mail server;

Fig. 14 is a flowchart showing a procedure for converting an attached file for each of the receivers' addresses and a procedure for constructing the converted attached file for each
15 of the receivers' addresses by the mail gateway;

Fig. 15 shows a data structure of the mail sent from the mail terminal;

Fig. 16 is an example of a table indicating information on file format conversion stored in the file format storing
20 unit;

Figs. 17A, 17B, and 17C show a data structure of the mail constructed for each of the receivers' addresses;

Fig. 18 is a block diagram showing the construction of the e-mail transmission/reception system including a mail
25 terminal, a mail gateway, and a mail server;

Fig. 19 shows an example of a data structure of the mail prepared by the mail preparation unit;

Figs. 20A and 20B shows an example of a data structure

of the mail constructed for each of the receivers' addresses. Fig. 21 is a block diagram showing the construction of the e-mail transmission/reception system including a mail terminal, a mail gateway, and a mail server;

5 Fig. 22 is a correspondence table consisting of "shared IDs", "attached IDs", and "sharers", in which the table is stored in the ID storing unit;

10 Fig. 23 is a flowchart showing a procedure for sharing the attached file belonging to a user of a mail terminal with the other users; and

 Fig. 24 is a flowchart showing a procedure for the mail gateway to construct the mail including the shared ID sent from the mail terminal.

15 DESCRIPTION OF THE PREFERRED EMBODIMENT

 The following describes an encrypted communication system 5 according to a preferred embodiment of the present invention.

[Embodiment 1]

20 Fig. 1 is a block diagram showing the construction of the e-mail transmission/reception system according to the first embodiment including a mail terminal 100, a mail gateway 110, and a mail server 120.

25 [Construction of the Mail Terminal 100]

 As shown in Fig. 1, the mail terminal 100 consists of an ID acquisition unit 101, a mail preparation unit 102, and a mail sending unit 103.

The ID acquisition unit 101 issues an ID acquisition request to the mail gateway 110 to acquire a list of attached IDs from the mail gateway 110. The acquired list is passed to the mail preparation unit 102.

5 Here, the attached ID refers to an identifier that is generated for and corresponds to each of the attached files included in the mail (hereafter abbreviated as "received mail") that the mail server 120 receives and stores for each user.

10 The mail preparation unit 102 prepares the mail that should be sent (hereafter abbreviated as "transmit mail" as distinguished from the received mail) and passes the mail to the mail sending unit 103. In this embodiment, instead of an attached file included in the received mail, an attached ID that specifies the attached file in accordance with a list of the
15 attached IDs passed from the ID acquisition unit 101 is included.

The mail sending unit 103 receives the transmit mail prepared by the mail preparation unit 102 and sends it to the mail gateway 110.

20 Here, the mail terminal 100 according to this embodiment is a mobile information terminal equipped with Mail User Agent (MUA). The MUA is a program for providing a user interface to read and write e-mail.

[Construction of the Mail Gateway 110]

25 The mail gateway 110 consists of an ID storing unit 111, a mail acquisition unit 112, a mail construction unit 113, a mail reception unit 114, and a mail sending unit 115.

The ID storing unit 111 stores attached IDs for each user.

Here, the attached IDs are associated with the attached files by the mail acquisition unit 112.

The mail acquisition unit 112 issues a request for acquisition of a list of attached files to the mail server 120 in response to the ID acquisition request from the mail terminal 100 to acquire the list from the mail server 120 and associates each attached file with an attached ID in accordance with the list. Then, the mail acquisition unit 112 stores the associated attached IDs in the ID storing unit 111 and sends it to the mail terminal 100. Also, the mail acquisition unit 112, in response to a request for acquisition of an attached file from the mail construction unit 113 and in accordance with correspondences between attached files and attached IDs that is stored in the ID storing unit 111, issues a request for acquisition of the attached file corresponding to the attached ID to the mail server 120 to acquire the attached file from the mail server 120, and passes it to the mail construction unit 113.

The mail construction unit 113 receives the transmitted mail that has been passed from the mail reception unit 114, and analyses it. As a result of the analysis, in case that the received mail does not include attached IDs, then the mail construction unit 113 passes the mail without being processed to the mail sending unit 115. Alternatively, in case that the received mail includes attached IDs, then the mail construction unit 113 extracts the attached IDs, issues a request for acquisition of the attached files corresponding to the extracted attached IDs to the mail acquisition unit 112 to receive the attached file from the mail acquisition unit 112.

Then, the mail construction unit 113 attaches the received attached file, instead of the attached ID, to the transmitted mail that has been passed from the mail reception unit 114 to construct a transmit mail, and passes the constructed transmit mail (hereafter called "constructed mail" as distinguished from the other mail) to the mail sending unit 115.

The mail reception unit 114 receives the transmit mail transmitted from the mail terminal 100 and passes it to the mail construction unit 113.

The mail sending unit 115 receives a transmit mail or a constructed mail that has been passed from the mail construction unit 113 and sends it to the mail server 120.

[Construction of the Mail Server 120]

The mail server 120 consists of a mail management unit 121, a mail spool 122, and a mail distribution unit 123.

The mail management unit 121 manages the received mail. When receiving a request for acquisition of a received mail or an attached file from the mail gateway 110, the mail management unit 121 acquires the received mail or the attached file from the mail spool 122, and sends it to the mail gateway 110. In addition, when receiving a request for acquisition of a list of received mail or a list of attached files, the mail management unit 121 acquires the list from the mail spool 122 and sends it to the mail gateway 110.

The mail distribution unit 123 receives mail (received mail) transmitted through Internet 130 or mail (transmit mail or constructed mail) transmitted from the mail gateway 110, keeps e-mail addressed to users whose addresses are managed by

the mail server 120 in the mail spool 122, and distributes e-mail addressed to the other users whose addresses are not managed by the mail server 120 to such addresses.

Here, the mail server 120 in this embodiment is a computer
5 equipped with Mail Transport Agent (MTA). The MTA is a program for delivering e-mail.

[Structure of Received Mail with an Attached File]

Fig. 2 shows a data structure of received mail with an attached file that the mail server 120 receives.

10 Here, the received mail 200 in this embodiment is described in a form of Multipurpose Internet Mail Extensions (MIME).

As shown in this figure, the received mail 200 with the attached file consists of a mail header 201, a message 202, and
15 attached files 203 through 206.

In the mail header 201, information for controlling the mail is described and the information includes a sender, receivers' addresses, a subject matter, a receiving date, a sending date, a message ID, and the like.

20 Here, the message ID is a character string that is generated for each piece of e-mail that the mail server 120 receives. For instance, in the e-mail described in a form of Request For Comment (RFC) 822, it is the character string described in the "Message-ID" field.

25 The message 202 consists of a MIME header 221 and a MIME message 222. Here, the mail header 201 and the message 202 are divided from each other by a blank line.

The attached files 203 through 206 are files that are

attached to the e-mail and they include document data, image data, sound data, and so on. Each attached file consists of a MIME header and a MIME message.

Here, the MIME header includes information on a contents name, a contents format (e.g., document, image, sound, their file formats and the like), and an encode format (base64 or the like). The MIME message includes the text data in case that the attached file includes text data, and includes the text data that has been converted by means of base 64 or the like in case that the attached file includes binary data (e.g., image, sound, or the like). Here, the MIME header and the MIME message are divided from each other by a blank line, and attached files are divided from one another by the boundary designating character string that is described in the mail header 201.

[Operations]

The following describes the operation of the above-mentioned e-mail transmission/reception system, taking transmission of the received mail 200 as an example. Hereafter, the mail that is prepared when forwarding the received mail 200 will be called "forwarded mail" as distinguished from the other mails.

Fig. 3 is a flowchart showing a procedure for forwarding the received mail 200 by the mail terminal 100.

As shown in this figure, when forwarding the received mail 200, firstly, the ID acquisition unit 101 in the mail terminal 100 acquires a list of attached IDs that has one to one correspondence to attached files included in the received mail 200 from the mail gateway 110 (Step S301).

Fig. 4 shows a sequence for acquiring an attached ID corresponding to each of the attached file included in the received mail 200.

As shown in this figure, the mail terminal 100 issues an ID acquisition request to the mail gateway 110 (S401). The mail gateway that receives the ID acquisition request issues a request for acquisition of a list of attached files to the mail server 120 (S402). The mail server that receives the request for acquisition of a list of attached files acquires a list of attached files included in the received mail from the mail spool 122 and sends the list to the mail gateway 110 (S403). The mail gateway 110 that receives the list associates each of the attached files with an attached ID in accordance with the list and sends the list of the attached IDs to the mail terminal 100 (S404).

Fig. 5A shows a data structure of the list of attached files that is transmitted in the above step S403 (a list 500 of attached files prepared from the received mail 200), and Fig. 5B shows a data structure of the list of IDs that is transmitted in the above step S404 (a list 501 of IDs prepared from the list 500).

As shown in this figure, the list 500 of attached files consists of a mail header 201 and MIME headers 221 through 261 of the received mail 200 .

The list 501 of IDs consists of an attached ID of a message 202 and attached IDs of attached files from 203 to 206. Here, the attached ID is made from a message ID that is described in the mail header 201 included in the attached file 500 and the

order of each of the MIME headers 221 through 226 when counting the order from the top of the list (attached order of the attached files).

Fig. 6 is a correspondence table between attached files and attached IDs in case that the message ID of the received mail 200 is set at "0123456789".

According to this figure, an attached ID corresponding to the attached file 203 that is firstly attached in the received mail 200 is "0123456789:001", and an attached ID corresponding to the attached file 204 which is secondly attached is "0123456789:002". Hereafter, a format of attached IDs corresponding to attached files is set at the form of "message ID : attached order of the attached file", and the attached ID of the message 202 is set at "0123456789:000".

These attached IDs are stored in the ID storing unit 111, and they are passed from the mail acquisition unit 111 in the mail gateway 110 to the mail terminal 100. Then the ID acquisition unit 101 in the mail terminal 100 acquires a list of attached IDs that is transmitted from the mail gateway 110.

Here, the mail terminal 100 in this embodiment is equipped with MUA by which acquired attached IDs can be browsed to select the attached ID corresponding to the attached file that should be attached.

Now, referring back to Fig. 3, the mail preparation unit 102 in the mail terminal 100 prepares forwarded mail including the attached ID that the ID acquisition unit 101 acquires as a substitute for the attached file included in the received mail 200 (Step S302).

Fig. 7 is a flowchart showing a procedure for describing attached IDs that the ID acquisition unit 101 acquires in the forwarded mail that is made from the received mail 200.

As shown in this figure, firstly, the mail terminal 100 displays a list of attached IDs which is acquired from the mail gateway 110 (Step S701). Next, the mail terminal 100 receives the attached ID that is selected by a user having the mail terminal 100 (Step S702). Then, the mail terminal 100 describes the received attached ID in the mail header of the forwarded mail (Step S703).

Fig. 8 shows a state where the mail preparation unit 102 prepares the forwarded mail made from the received mail.

As shown in this figure, the mail terminal 100 consists of a terminal 800 and a pen 801.

The display unit in the terminal 800 displays forwarded mail 802 made from the received mail 200 and a list 803 of attached IDs having one to one correspondence to attached files included in the received mail 200. The list 803 is a list of attached IDs that the ID acquisition unit 101 acquires. The user having the mail terminal 100 selects the attached ID corresponding to the attached file that the user wants to attach to the forwarded mail 802 from the list 803 by touch-inputting with the pen 801. Then, the selected attached file is described in the mail header in the forwarded mail 802.

Fig. 9 shows an example of a data structure of the forwarded mail 802 prepared by the mail preparation unit 102. As shown in this figure, the forwarded mail 802 consists of a mail header 901 and a message 902. The mail header 901 consists

of a sub header 911 including information on a sender, receivers' addresses, the other receivers' addresses, a subject matter, and the like and a sub header 912 including attached IDs. In the sub header 911, a forwarding address of the forwarded mail or the like is described. In the sub header 912, the attached IDs that are selected from the list of attached IDs that the ID acquisition unit 101 acquires is described. The order of the described attached IDs is the selected order and is also the order for attaching these IDs to the forwarded mail 802.

Here, as for the mail having an RFC 822 format, a character string which begins with "X-" can be used as a user-definable string. Therefore, in this embodiment, a field identifier is set at "X-Attach-Mail-id" in order to identify that the attached ID corresponds to the attached file and "X-Attach-Mail-id: attached ID" is described in the sub header 912.

The message 902 consists of text data and the content described there becomes the main body of the mail.

Then, referring back to Fig. 3, the mail terminal 100 passes the forwarded mail 802 prepared by the mail preparation unit 102 to the mail sending unit 103 to transmit it to the mail gateway 110 (Step S303).

Fig. 10 shows a sequence for sending the forwarded mail 802 prepared from the received mail 200 by the mail preparation unit 102 to the forwarding address.

As shown in this figure, the mail terminal 100 sends the forwarded mail 802 prepared by the mail preparation unit 102 to the mail gateway 110 (S1001).

The mail gateway 110 receives the forwarded mail 802, analyses the received forwarded mail 802, and extracts the attached ID described in a field identifier "X-Attach-Mail-id". Then, the mail gateway 100 issues a request for acquisition of the attached file corresponding to the attached ID to the mail server 120 in accordance with the extracted attached ID (the attached ID described in the sub header 912) (S1002).

The mail server 120 receives the request for acquisition of the attached file and transmits the attached file corresponding to the attached ID that is stored in the mail spool 122 to the mail gateway 110 (S1004).

The mail gateway 110 receives the attached file corresponding to the attached ID, attaches the attached file corresponding to the received attached ID, as a substitute for the attached ID, to the mail to construct the forwarded mail 802. Then, the mail gateway 110 sends the constructed mail to the mail server 120 (S1004).

The mail server 120 receives the constructed mail and distributes the mail to the receivers' addresses (S1005).

Fig. 11 is a flowchart showing a procedure for the mail gateway 110 to construct the forwarded mail sent from the mail terminal 100 (procedure from S1001 to S1004).

As shown in this figure, the mail reception unit 114 in the mail gateway 110 receives the mail that is sent from the mail terminal 100 (Step S1101) and passes the received mail to the mail construction unit 113. Then, the mail construction unit 113 analyses the mail whether attached IDs are included

or not (Step S1102).

As a result of the analysis, in case that attached IDs are included, the mail gateway 110 extracts the attached IDs from the received mail (Step S1103) and acquires attached files
5 corresponding to the attached IDs from the mail server 120 (Step S1102). Then, the mail gateway 110 attaches the acquired attached files, as a substitute for the attached IDs, to the mail to construct the mail (Step S1105). Finally, the mail gateway 110 passes the constructed mail to the mail sending unit
10 115 to transmit it to the mail server 120 (Step S1106).

Alternatively, in case that attached IDs are not included in the Step S1102, the mail gateway 110 passes the received mail without being processed to the mail sending unit 115 to transmit it to the mail server 120 (S1106).

15 Fig. 12 shows a data structure of the mail constructed from the forwarded mail 802 by the mail gateway 110. As shown in this figure, the constructed mail 1200 consists of a mail header 1201, a message 1202, and attached files 1203 through 1206.

20 In the mail header 1201, information for controlling the mail is described, and the information includes a sender, receivers' addresses, the other receivers' addresses, a subject matter, and the like.

The message 1202 consists of a MIME header 1221 and a MIME
25 message 1222.

Each of the attached files 1203 through 1206 consists of a MIME header and a MIME message, and the attached files 1203, 1204, 1205, and 1206 correspond to a message 202, an attached files

206, 203, and 205, respectively.

As stated above, according to the e-mail transmission/reception system of this embodiment, an attached ID is associated with each of attached files included in the received mail 200 and forwarded mail 802 corresponding to the received mail 200 is prepared using the associated attached IDs by the mail terminal 100. Further, the constructed mail 1200 is constructed from the forwarded mail 802 by the mail gateway 110. Finally, the constructed mail 1200 is distributed as a substitute for the forwarded mail 802 from the mail server 120 to the receivers' addresses of the mail.

[Others]

In the above embodiment, the mail terminal 100 is a mobile information terminal. However, this may be a cellular phone, a handheld PC, a personal computer (PC), or the like.

In the above embodiment, the mail terminal 100 acquires attached IDs for each piece of e-mail. However, the mail terminal 100 may acquire attached files which correspond to a plurality of attached files included in a plurality pieces of e-mail.

As for the mail terminal 100 in this embodiment, when preparing a new e-mail with an attached file using a plurality of attached files included in the stored plurality pieces of e-mail, the new e-mail may include an attached ID corresponding to the attached file as a substitute for the attached file.

In the above embodiment, the mail gateway 110 associates attached IDs with attached files for each piece of e-mail. However, the mail gateway 110 may associates attached IDs with

attached files using a list prepared by bringing together a plurality of lists of attached files, in which each of the lists are included in a piece of e-mail.

In the above embodiment, the mail server 120 transmits a list of attached files in accordance with a request for acquisition of a list of attached files from the mail gateway 110. However, whenever e-mail addressed to the user having the mail terminal 100 is received, the mail server 120 may transmit a list of attached files included in the received mail to the mail gateway 110.

In the above embodiment, a list of attached files includes header information consisting of a mail header and a MIME header of the received mail. However, this may be not header information on the received mail, but may be any information prepared from the header information on the received mail and by which attached files can be identified. For example, this may be a list of file names of the attached files, or simply the number of attached files.

In the above embodiment, a format of the attached IDs is set at "message ID : the attached order of the attached file". However, this may be set at "message ID : the attached order of the attached file : file name of the attached file".

In the above embodiment, a list of attached files is browsed by using MUA provided in the mail terminal 100. However, this procedure may be performed using WWW browser software.

The mail gateway 110 and the mail server 120 may be constructed by an integrated computer system.

The e-mail transmission/reception system of this

embodiment can be realized by providing a program for attaching an attached file corresponding to an attached ID and constructing mail and a program for preparing e-mail with the attached ID corresponding to the attached file that should be attached and by running these programs on general hardware such as computers. If these programs are recorded on recording media such as CD-ROMs that are readable for computers, they can be run on another computer. Further, these programs can be run on the computer which downloads them via communication media such as networks.

[Embodiment 2]

Fig. 13 is a block diagram showing the construction of the e-mail transmission/reception system according to the second embodiment including a mail terminal 140, a mail gateway 150, and a mail server 120.

Fig. 13 is different from the construction in Fig. 1 in that the mail terminal 140 and the mail gateway 150 are provided as substitutes for the mail terminal 100 and the mail gateway 110, respectively. In the following description, explanation for the same elements as in Fig. 1 will be omitted, but different elements will be focused on.

[Different Elements from the Mail Terminal 100]

As shown in Fig. 13, the mail terminal 140 is different from the mail terminal 100 in that a file format registration unit 141 is further provided.

The file format registration unit 141 transmits file format

conversion information including a receiver's address of the mail and a file format of the attached files which should be adopted by the receiver to the mail gateway 150.

5 [Different Elements from the Mail Gateway 110]

The mail gateway 150 is different from the mail gateway 110 in that a mail construction unit 153 is provided as a substitute for the mail construction unit 113, and a data conversion unit 151 and a file format storing unit 152 are further provided.

The data conversion unit 151 receives file format conversion information transmitted from the mail terminal 140 and stores the information in the file format storing unit 152. In addition, the data conversion unit 151 converts a file format of the attached file passed from the mail construction unit 153 for each receiver's address in accordance with the file format conversion information stored in the file format storing unit 152. Then, the data conversion unit 151 passes the converted attached file to the mail construction unit 153.

The file format storing unit 152 stores file format conversion information for each receiver's address.

The mail construction unit 153 is different from the mail construction unit 113 shown in Fig. 1 in that this unit (i.e., 153) further passes attached files acquired by the mail acquisition unit 112 and a receiver's address of the attached file to the data conversion unit 151, receives the attached files that is converted by the data conversion unit 151, and constructs the mail for each receiver's address.

[Different Operations from Embodiment 1]

As for the e-mail transmission/reception system having the above-mentioned construction, explanation for the operations will be given below with mainly focusing on the differences from Embodiment 1.

Fig. 14 is a flowchart showing a procedure for converting an attached file for each of the receivers' addresses and a procedure for constructing the converted attached file for each of the receivers' addresses by the mail gateway 150.

As shown in this figure, the mail reception unit 114 in the mail gateway 150 receives the mail sent from the mail terminal 140 (Step S1401). When the received mail is passed to the mail construction unit 153, the mail construction unit 153 extracts a receiver's address of the mail and substitutes the total number of the receivers' addresses into a variable N (Step S1402). Then, the mail gateway 150 analyses whether attached IDs are included in the mail (Step S1403).

As a result of the analysis, in case that attached IDs are included, the mail gateway 150 extracts the attached IDs associated with the attached files from the mail (Step S1404), and acquires the attached files corresponding to the extracted attached IDs from the mail server 120 (Step S1405). Alternatively, in case that attached IDs are not included, the mail gateway 150 checks the number of attached files included in the mail (Step S1406). In case that the mail does not include attached files, then the mail gateway 150 passes the received mail without being processed to the mail sending unit 115 to transmit it to the mail server 120 (Step S1417).

Next, the mail gateway 150 substitutes the total number of attached files included in the mail into a variable M (S1407), substitutes 1 into a variable X (Step S1408), and substitutes 1 into a variable Y (Step S1409).

- 5 Then, the mail gateway 150 checks a file format of the Yth attached file corresponding to the Xth receiver's address in accordance with file format conversion information stored in the file format storing unit 152 (Step S1410).

- 10 In case that the receiver's address and the file format of the attached file that the receiver should adopt correspond each other, the mail gateway 150 converts the format of the attached file into the file format that the receiver should adopt (Step S1411).

- 15 Next, the mail gateway 150 judges whether the variable Y equals to the variable M or not (Step S1412). In case that they are not equal, then 1 is added to the variable Y and the procedure returns to the Step S1410 (Step S1413). In case that they are equal, the mail gateway 150 attaches the acquired attached file or the converted attached file as a substitute
20 for the attached ID or the attached file to the mail addressed to the Xth receiver's address to construct mail (Step S1414).

- 25 Next, the mail gateway 150 judges whether the variable X equals to the variable N or not (Step S1415). In case that they are not equal, then 1 is added to the variable X and the procedure returns to the Step S1409 (Step S1416). In case that they are equal, the mail gateway 150 passes the mail constructed for each receiver's address to the mail sending unit 115 to transmit it to the mail server 120 (Step S1417).

Fig. 15 shows a data structure of the e-mail (prepared by the mail preparation unit 102) sent from the mail terminal 140.

As shown in this figure, the mail 1500 consists of a mail header 1501 and a message 1502.

5 In the mail header 1501, sender (From: user1@aaa.aaa.aa), receivers' addresses (To:user2@bbb.bbb.bb, user3@ccc.ccc.cc), the other receivers' addresses (Cc:user4@ddd.ddd.dd), a subject matter (Subject: this is data!) are described.

10 In addition, attached IDs which are associated with the attached files that should be attached to the mail 1500 are described (X-Attach-Mail-id: 00112233:002 and X-Attach-Mail-id: 00112233:004).

The message 1502 consists of text data and the content described there becomes the main body of the mail.

15 Here, an attached file which is associated with the attached ID "00112233:002" is a document file whose file name is "shiryou1.doc" and an attached file which is associated with the attached ID "00112233:004" is an image file whose file name is "shiryou2.bmp".

20 Fig. 16 is an example of file format conversion information stored in the file format storing unit 152.

25 As shown in this figure, the file format storing unit 152 stores a correspondence table 1600 between receivers' addresses and file formats of attached files that the receiver should adopt.

Figs. 17A, 17B, and 17C show an example of a data structure of the mail constructed using the mail 1500 for each of the receivers' addresses. In constructing the mail, file formats

of the attached files are converted for each receiver's address in accordance with the file format conversion information shown in the correspondence table 1600.

As shown in this figure, three pieces of e-mail 1700 (receiver's address: user2@bbb.bbb.bb), 1701 (receiver's address: user3@ccc.ccc.cc), and 1702 (receiver's address: user4@ddd.ddd.dd) are prepared from a piece of e-mail 1500. As stated above, according to the e-mail transmission/reception system of this embodiment, when forwarding attached files included in the received mail, file formats of the attached files are converted for each receiver's address to construct the mail. Therefore, the system can deliver e-mail including attached files to a plurality of receivers' addresses, in which considerations are given to the attached files for each receiver's address.

[Others]

In the above embodiment, the mail terminal 140 may register file format conversion information in the mail gateway 150 by means of WWW browser software.

[Embodiment 3]

Fig. 18 is a block diagram showing the construction of the e-mail transmission/reception system according to the third embodiment including a mail terminal 160, a mail gateway 170, and a mail server 120.

Fig. 18 is different from the construction in Fig. 1 in that the mail terminal 160 and the mail gateway 170 are provided

as substitutes for the mail terminal 100 and the mail gateway 110, respectively. In the following description, explanation for the same elements as in Fig. 1 will be omitted, but different elements will be focused on.

5 [Different Elements from the Mail Terminal 100]

The mail terminal 160 is different from the mail terminal 100 in that a mail preparation unit 162 is provided as a substitute for the mail preparation unit 102.

The mail preparation unit 162 is different from the mail preparation unit 102 shown in Fig. 1 in that a data format of a field "X-Attach-Mail-id" described in the mail header is set at "X-Attach-Mail-id: attached ID: processing information on attached files" instead of "X-Attach-Mail-id: attached Id".

Here, the processing information on attached files specifies a process in which the mail gateway 170 processes attached files corresponding to the attached IDs selected by the user (e.g., conversion of file formats of the attached files) and this means information consisting of "file formats of the attached files" which are to be converted and "receiver's addresses of the converted attached files".

That is, as for the mail whose mail header has a description "X-Attach-Mail-id: attached ID: processing information of the attached files", a file format of the mail is converted into the file format which is designated by the "file format of the attached files" included in the "processing information of the attached files" and transmits the converted attached files to the receiver's address which is designated by the "receiver's address of the attached files" included in

the "processing information on the attached files".

Here, the format of the "processing information on the attached files" in this embodiment is set at "file format of the attached files: receiver's address of the attached files".

5 In addition, the "file format of the attached files" and the "receiver's address of the attached files" in the processing information on the attached information may be omissible. In case that the former is omitted, the attached file corresponding to the "attached ID" is transmitted to the receiver's address
10 which is designated by the "receiver's address of the attached files" in the "processing information on the attached files". In case that the latter is omitted, the attached file corresponding to the "attached ID" is converted to the file format which is designated by the "file format of the attached
15 files" in the "processing information on the attached files" and attaches the converted attached file to the mail.

[Different Constructions from the Mail Gateway 110]

The mail gateway 170 is different from the mail gateway
20 110 in that a data conversion unit 173 is provided as a substitute for a mail conversion unit 113, and a data conversion unit 171 and a fax sending unit 172 are further provided.

The data conversion unit 171 receives attached files and a file format to which the attached files should be converted from the
25 mail construction unit 173, and converts a file format of the attached files. Then, the data conversion unit 171 passes the converted attached files to the mail construction unit 173.

The FAX sending unit 172 receives the attached files

(converted in a FAX form) from the mail construction unit 173 and a FAX receiver's address, and faxes the attached files to the FAX receiver's address.

The mail construction unit 173 is different from the mail construction unit 113 in that this unit (i.e., 173) further passes the attached files acquired by the mail acquisition unit 112 and the processing information (a file format and a receiver's address) on the attached files which is described in the mail header to the data conversion unit 171, receives the attached files converted by the data conversion unit 171, and constructs mail for each receiver's address of the attached files. The constructed mail is passed to the mail sending unit 115, and the attached files to be faxed are passed to the FAX sending unit 172 as well as the FAX number of the receiver.

[Different Operations from Embodiment 1]

As for the e-mail transmission/reception system according to the third embodiment having the above-mentioned construction, explanation for the operations will be given below with mainly focusing on the differences from Embodiment

1.

The mail preparation unit 162 prepares mail whose mail header has the description "X-Attach-Mail-id: attached ID: processing information on the attached files". The prepared mail is passed to the mail sending unit 103 to be transmitted to the mail gateway 170. The mail gateway 170 that receives the mail from the mail terminal 160 performs a process for the attached file corresponding to the "attached ID" that is described in the mail header in accordance with the "processing information on the

attached files" that is described in the mail header.

Fig. 19 shows an example of a data structure of the mail prepared by the mail preparation unit 162.

As shown in this figure, the mail 1900 consists of a mail header 1901 and a message 1902. The mail header 1901 includes a sub header 1911 in which a sender (From: user_a@xxx.xxx.xxx), receivers' addresses (To: user_b@yyy.yyy.yyy, user_c@zzz.zzz.zzz), and a subject matter (Subject: this is data!!) are described and a sub header 1912 in which attached IDs that are associated with the attached files that should be attached are described.

For instance, suppose that file names of the attached files corresponding to "ABCDEFGH:004", "PQRSTUVW:002", "EFGHIJKL:005", and "GHIJKLMN:003:fax" are respectively set at "File1.txt", "File2.gif", "File3.bmp", and "File4.jpg". In this case, the mail gateway 170 that receives the mail 1900 performs the following process in accordance with the description of the sub header 1912.

The 4th attached file (when counting from the top in the mail) included in the mail "message ID: ABCDEFGH" is attached to the mail ("X-Attach-Mail-id: ABCDEFGH:004").

The 2nd attached file (when counting from the top in the mail) included in the mail "message ID: PQRSTUVW" is converted to a bmp format, and the converted attached file (whose file name is changed to "File2.bmp" after conversion) is attached to the mail ("X-Attach-Mail-id: PQRSTUVW:002:bmp").

The 5th attached file (when counting from the top in the mail) included in the mail "message ID: EFGHIJKL" is converted

to a jpg format, and the converted attached file (whose file name is changed to "File3.jpg" after conversion" is attached to the mail addressed to the receiver's address (user_c@zzz.zzz.zzz) ("X-Attach-Mail-id: EFGHIJKL:005:jpg:user_c@zzz.zzz.zzz").

The 3rd attached file (when counting from the top in the mail) included in the mail "message ID:GHIJKLMN" is converted to a FAX format, and the converted attached file is faxed to the fax number "0123-45-6789" ("X-Attach-Mail-id: GHIJKLMN:003:fax:0123456789").

As a result of the process by the mail gateway 170, e-mail is constructed for each receiver's address from the mail 1900. Fig. 20A and 20B show an example of a data structure of the mail constructed for each receiver's address from the mail 1900. Here, Fig. 20A shows constructed mail 2000 addressed to a receiver's address (user_b@yyy.yyy.yyy) and Fig. 20B shows constructed mail 2001 addressed to a receiver's address (user_c@zzz.zzz.zzz).

As shown in these figures, when specifying "receiver's address of the attached files" in the "processing information on the attached files", the attached files are attached to the mail addressed to only the specified receivers' addresses. When specifying a FAX format in the "file format of the attached files" and a FAX number in the "receiver's address of the attached files", the attached file corresponding to the specified attached ID is converted to a FAX format and the converted attached file is faxed to the specified FAX number. As described above, according to the e-mail

transmission/reception system of this embodiment, when forwarding each of the attached files included in the received mail, file formats of the attached files are converted for each receiver's address to construct the mail. In addition, according to this embodiment, each attached file can be faxed and printed by the fax as a handy printer. Thereby, the content of the received attached file can be confirmed by a user, even when the user does not have a tool for receiving e-mail.

[Others]

In the above embodiment, the mail gateway 170 may inform a sender of the mail and a receiver of the fax that the attached files cannot be converted to a FAX format in case of such attached files (e.g., sound information, moving video information).

[Embodiment 4]

Fig. 21 is a block diagram showing the construction of the e-mail transmission/reception system according to the fourth embodiment including a mail terminal 180, a mail gateway 190, and a mail server 120.

Fig. 21 is different from the construction shown in Fig. 1 in that the mail terminal 180 and the mail gateway 190 are provided as substitutes for the mail terminal 100 and the mail gateway 110, respectively. In the following description, explanation for the same elements as in Fig. 1 will be omitted, but different elements will be focused on.

[Different Constructions from the Mail Terminal 100]

As shown in Fig. 21, the mail terminal 180 is different from the mail terminal 100 in that an ID acquisition unit 181

and a mail preparation unit 182 are provided as substitutes for the ID acquisition unit 101 and the mail preparation unit 102, respectively, and a sharing notification unit 184 is further provided.

5 The ID acquisition unit 181 is different from the ID acquisition unit 101 shown in Fig. 1 in that the unit (i.e., 181) notifies the sharing notification unit 184 of the attached files that should be shared with the other users out of the attached files sent to the user having the mail terminal 180. 10 In this case, the ID acquisition unit 181 passes the attached IDs which are associated with the attached files that should be shared with the other users and which are selected from the list of the attached IDs that the ID acquisition unit 181 acquires to the sharing notification unit 184. In addition, 15 the ID acquisition unit 181 acquires a list of shared IDs which are associated with the attached files that are owned by the other users and the user having the mail terminal 180 shares. Then, the acquired list of the shared IDs is passed to the mail preparation unit 182.

20 Here, the shared IDs are not identifiers that are associated with files by the mail acquisition unit 192 but identifiers that are associated with files by the shared ID management unit 194 and that are available only for sharers of attached files which are associated with the shared IDs.

25 The mail preparation unit 182 is different from the mail preparation unit 102 shown in Fig. 1 in that this unit (i.e., 182) can specify the attached files that should be forwarded by the shared IDs in accordance with the list of shared IDs passed

from the ID acquisition unit 181. Here, the shared IDs may be specified as "X-Attach-Mail-id: shared Id" in the mail header instead of "X-Attach-Mail-id: attached ID".

The sharing notification unit 184 receives attached IDs from the ID acquisition unit 181, specifies a user (sharer) who shares the attached files corresponding to the attached IDs, and transmits shared information including the attached IDs and the sharers who shares the attached files to the mail gateway 190. Here, sharers can be specified for only the attached files that are owned by the user having the mail terminal 180. [Different Constructions from the Mail Gateway 110]

The mail gateway 190 is different from the mail gateway 110 in that an ID storing unit 191, a mail acquisition unit 192, a mail construction unit 193 are provided as substitutes for the ID storing unit 111, a mail acquisition unit 112, and the mail construction unit 113, respectively, and a shared ID management unit 194 is further provided.

The ID storing unit 191 is different from the ID storing unit 111 shown in Fig. 1 in that this unit (i.e., 191) further stores a list of shared IDs which are associated with files by the shared ID management unit 194.

Fig. 22 is a correspondence table consisting of "shared IDs", "attached IDs", and "sharers", in which the table is stored in the ID storing unit 191.

The mail acquisition unit 192 is different from the mail acquisition unit 112 shown in Fig. 1 in that this unit (i.e., 192) further transmits a list of shared IDs stored in the ID storing unit 191 to the mail terminal 180 in response to an ID

acquisition request from the mail terminal 180. In addition, the mail acquisition unit 192 acquires the attached files (which correspond to the attached IDs that corresponds to the shared IDs and which are owned by the other users) corresponding to the shared IDs from the mail server 120 in response to a request for acquisition of the attached files from the mail construction unit 193 and on the basis of the correspondence between the list of attached IDs and the list of shared IDs which are stored in the ID storing unit 191.

The mail construction unit 193 is different from the mail construction unit 113 shown in Fig. 1 in that, in case that the received mail includes shared IDs, this unit (i.e., 193) extracts the shared IDs, issues a request for acquisition of the attached files corresponding to the shared IDs to the mail acquisition unit 192, and acquires the attached files from the mail acquisition unit 192. In this case, a sender of the mail must belong to sharers of the attached files.

The shared ID management unit 194 receives shared information transmitted from the mail terminal 180, generates and associates shared IDs from the shared information for each attached ID of the shared information, associates "attached IDs" and "sharers" with the "shared IDs", and stores them in the ID storing unit 151. Here, in case that the shared IDs have been associated with attached IDs in the shared information, the shared ID management unit 194 adds the shares of the shared information to the sharers corresponding to such shared IDs.

[Different Operations from the Mail Terminal 180]

As for the e-mail transmission/reception system according to the fourth embodiment having the above-mentioned construction, explanation for the operations will be given below with mainly focusing on the differences from Embodiment 1.

Fig. 23 is a flowchart showing a procedure for sharing the attached file belonging to a user of the mail terminal 180 with the other users.

[Procedure by the Mail Terminal 180]

The mail terminal 180 passes the attached IDs which are associated with the attached files that should be shared with the other users and which are selected from the list of attached IDs that the ID acquisition unit 181 acquires to the shared notification unit 184 (Step S2301). Next, the mail terminal 180 receives the attached IDs from the ID acquisition unit 181, specifies sharers of the attached files corresponding to the attached IDs, and transmits shared information on the attached IDs and the sharers of the attached files corresponding to the attached IDs to the mail gateway 190 (Step S2302). Here, sharers can be specified only for the attached files that are owned by the user having the mail terminal 180.

[Procedure by the Mail Gateway 190]

Then, the mail gateway 190 receives the shared information from the mail terminal 180, generates and associates shared IDs from the shared information for each ID of the shared information, associates "attached IDs" and "sharers" with the "shared IDs", and stores them in the ID storing unit 191. Here, in case that the shared IDs have been

associated with attached IDs in the shared information, the shared ID management unit 194 adds the sharers of the shared information to the sharers corresponding to such shared IDs (Step S2303).

5 As described above, the shared IDs (which are associated with the shared attached files) are transmitted together with the attached IDs from the mail gateway 190 when the sharer of the attached IDs issue an ID acquisition request to the mail gateway 190. Then, the received shared IDs can be available
10 among the sharers.

The following will describe the procedure for constructing the mail including the shared IDs transmitted from the mail terminal 180.

Fig. 24 is a flowchart showing a procedure for the mail
15 gateway 190 to construct the mail including the shared ID sent from the mail terminal 180.

As shown in this figure, the mail gateway 190 passes the received mail that is sent from the mail terminal 180 to the mail construction unit 193. The mail construction unit
20 analyses whether the mail includes shared IDs or not (Step S2401).

As a result of the analysis, in case that the mail does not include shared IDs, the mail gateway 190 passes the mail without being processed to the mail server 120 (Step S2405).

25 In case that the mail includes shared IDs, the mail gateway 190 extracts the shared IDs from the mail (Step S2402) and acquires the attached files corresponding to the extracted shared IDs from the mail server 120 (Step S2403). Then, the mail gateway

190 attaches the acquired attached files, as substitutes for the shared IDs, to the mail to construct the mail (Step S2404). Finally, the mail gateway 190 sends the constructed mail to the mail server 120 (Step S2405).

5 As stated above, according to the e-mail transmission/reception system of this embodiment, each attached file included in the received mail can be shared with the other users and shared IDs can be associated with the shared attached files, so that the associated shared IDs are available
10 among the sharers. Therefore, attached files that belong to the other users also can be transmitted to receivers of the mail by preparing the mail including the shared IDs.

Although the present invention has been fully described by way of examples with reference to the accompanying drawings,
15 it is to be noted that various changes and modifications will be apparent to those skilled in the art. Therefore, unless such changes and modifications depart from the scope of the present invention, they should be construed as being included therein.